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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,085	09/29/2000	Hye-Jeong Kim	678-529 (P9530)	2155

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EXAMINER	
KADING, JOSHUA A	
ART UNIT	PAPER NUMBER
2661	

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/677,085	KIM ET AL.	
	Examiner	Art Unit	
	Joshua Kading	2661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-11,13 and 14* is/are rejected.

7)☒ Claim(s) *4 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4-19-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,809,083 (Wright) in view of U.S. Patent 6,038,450 (Brink et al.).

Regarding claim 1, Wright discloses, "a timing error compensation system..., comprising: a pilot symbol inserter for receiving a spread data symbol stream, and periodically inserting N pilot symbols each having a same phase using a specific period in a symbol unit to compensate a timing error of a receiver (figure 3, element 416' as described in col. 4, lines 62-67)."

However, Wright lacks what Brink disclose, "an OFDM/CDMA (Orthogonal Frequency Division Multiplexing/code Division Multiple Access) communication system (col. 1, lines 42-col. 2, lines 1-14)."

It would have been obvious to one of ordinary skill in the art at the time of invention to include the OFDM/CDMA system for the purpose of reducing interference and increasing the number of users through multiple access techniques. The motivation being that more users and less interference is better communication and less complicated processing on the receiver end due to lack of a complex equalizer.

Claims 2, 3, and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,608,764 (Sugita et al.) in view of Wright in further view of Brink.

Regarding claim 2, Sugita discloses, "a timing error compensation system...an analog-to-digital converter which converts a...signal to a digital...stream using sampling synchronization (figure 3, elements 29 and 30); a data...stream received from a transmitter (figure 3 where the data path implies data stream)...; a guard interval remover for removing a guard interval (figure 3, element 31)...; and a fast Fourier transform (FFT) device for performing fast Fourier transform on the guard interval...and outputting a data...stream (figure 3, element 33), said timing error compensation system comprising:" and "a timing compensator which determines a linear phase difference line for the detected [data] using the [data] and a reference [data] previously known by the receiver, generates a timing error estimation signal according to the determined linear phase difference line, and provides the timing error estimation signal to the analog-to-digital converter and the guard interval remover so as to determine the sampling sync on synchronization and the frame synchronization (figure 3, elements 29, 30, 31, 45,

and 50 and figure 4, elements 45, 61, and 62 where figure 4 shows the timing error compensator that generates the phase difference signal that is then applied as seen in figure 3; the function of figure 4 is described in col. 6, lines 10-42)."

However, Sugita lacks what Wright discloses, "Wright discloses, "a pilot symbol detector which receives the data symbol stream and detecting the pilot symbols inserted in the data symbol stream at predetermined intervals in a symbol unit (figure 3, element 416' as described in col. 4, lines 62-67)..."

It would have been obvious to one of ordinary skill in the art to include a pilot symbol inserter for the purpose of allowing the receiver to estimate the state of the channel. The motivation for estimating the state of the channel is so that the receiver can use that information to compensate for the effects of channel fading (Wright, col. 2, lines 5-9).

Sugita and Wright however, further lack what Brink discloses, "an OFDM/CDMA communication system said OFDWCDMA communication (col. 1, lines 42-col. 2, lines 1-14)."

It would have been obvious to one of ordinary skill in the art at the time of invention to include the OFDM/CDMA system for the purpose of reducing interference and increasing the number of users through multiple access techniques. The motivation being that more users and less interference is better communication and less complicated processing on the receiver end due to lack of a complex equalizer.

Regarding claim 5, Sugita discloses, "a timing error compensation system...a data...stream received from a transmitter...outputting a data...stream through a fast Fourier transform, said timing error compensation system comprising: a timing compensator to determine a linear phase difference line for the detected [data], and generate a timing error estimation signal according to the determined linear phase difference line (figure 3, elements 29, 30, 31, 45, and 50 and figure 4, elements 45, 61, and 62 where figure 4 shows the timing error compensator that generates the phase difference signal that is then applied as seen in figure 3; the function of figure 4 is described in col. 6, lines 10-42)...an analog-to-digital converter to determine sampling synchronization according to the timing error estimation signal from the timing compensator (figure 3, elements 29 and 30)...; and a guard interval remover to determine frame synchronization according to the timing error signal from the timing compensator, and to remove a guard interval...from the analog-to-digital converter (figure 3, element 31)."

However, Sugita lacks what Wright discloses, "a pilot symbol is inserted at periods of a prescribed number of data symbols and a pilot symbol detector to detect a pilot symbol inserted in the data symbol stream at prescribed intervals (col. 1, lines 42-col. 2, lines 1-14); and converting the...signal to a digital...symbol...(figure 4, element 408)..."

It would have been obvious to one of ordinary skill in the art to include a pilot symbol inserter with conversion of the signal to a symbol for the purpose of allowing the receiver to estimate the state of the channel. The motivation for estimating the state of

the channel is so that the receiver can use that information to compensate for the effects of channel fading (Wright, col. 2, lines 5-9).

Sugita and Wright however, further lack what Brink discloses, "an OFDM/CDMA communication system, which receives an OFDM signal (col. 1, lines 42-col. 2, lines 1-14)."

It would have been obvious to one of ordinary skill in the art at the time of invention to include the OFDM/CDMA system for the purpose of reducing interference and increasing the number of users through multiple access techniques. The motivation being that more users and less interference is better communication and less complicated processing on the receiver end due to lack of a complex equalizer.

Regarding claims 3 and 6, Sugita, Wright, and Brink disclose the systems of claims 2 and 5. However, Wright and Brink lack what Sugita further discloses, "a phase detector to detect a phase of the pilot symbol in a sample data unit (figure 5, element 61 or 62); a phase difference detector to detect a phase difference between the detected phase of the pilot sample and a reference phase and converting the detected phase difference to a value within a specific range (figure 5, element 65); a phase fluctuation estimator to determine a phase difference line by accumulating the phase difference in a symbol unit, and counting a number of transitions in the phase difference line (figure 5, element 67 as described in col. 8, lines 62-col. 9, lines 1-3 where transitions are counted by the adding of the output of element 65 because each sign (transition) is added (a way of counting) to determine the direction of the carrier frequency for timing

correction); and a timing error estimation signal generator to generate a timing error estimation signal for compensating a timing error according to the count value of the transition number (figure 5, element 73)." It would have been obvious to one of ordinary skill in the art at the time of invention to include the phase detector, phase difference detector, phase fluctuation estimator, and the signal generator for the same reasons and motivation as in claims 2 and 5.

Regarding claim 7, Sugita, Wright, and Brink disclose the system of claim 6. However, Wright and Brink lack what Sugita discloses, "wherein a timing error estimation signal for compensating a timing error within a sample period is generated when the transition number count value is less than 1, and a timing error estimation signal for compensating a timing error over the sample period is generated when the transition number count value is greater than 1 (figure 5, where the outputs of element 68 show that a decision is made as to the timing signal generation based on the transition value A; it should be further noted that although Sugita discloses the count value is less than or greater than 0 instead of 1, one of ordinary skill in the art would recognize that choosing this value is simply a matter of design choice and completely dependent on how the system was designed)." It would have been obvious to one of ordinary skill in the art at the time of invention to have a the timing error signal generation decision based on a transition count for the same reasons and motivation as in claim 6.

Claims 8, 10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugita et al. in view of Wright.

Regarding claim 8, Sugita discloses, "a method for compensating a timing error in an OFDM system (col. 8, line 50)...the method comprising the steps of: calculating a phase difference between a detected phase of the pilot symbol and a reference phase, and converting the calculated phase to a phase difference value within a specific range (figure 4, elements 61, or 62, and 65 as described in col. 8, lines 50-64); and compensating a timing error using a transition number of the converted phase difference value (col. 8, lines 64-col. 9, lines 1-3 where the transitions added constitute a transition number used in the timing error compensation)."

However, Sugita lacks what Wright discloses, "detecting a pilot symbol inserted in a received data symbol stream at predetermined intervals (col. 1, lines 42-col. 2, lines 1-14)."

It would have been obvious to one of ordinary skill in the art to include a pilot symbol inserter for the purpose of allowing the receiver to estimate the state of the channel. The motivation for estimating the state of the channel is so that the receiver can use that information to compensate for the effects of channel fading (Wright, col. 2, lines 5-9).

Regarding claim 10, Sugita discloses, "a method for compensating a timing error in an OFDM system...the method comprising the steps of: detecting a phase of the

detected pilot symbol in a sample data unit (figure 4, elements 61, or 62, and 65 as described in col. 8, lines 50-64); calculating a phase difference between the detected phase of the pilot symbol and a reference phase, and converting the calculated phase to a phase difference value within a specific range (figure 4, element 65 as described in col. 8, lines 50-64); counting a number of transitions within a specific range for the respective data samples (figure 4, element 65 and 66); determining whether the count value is larger than a prescribed value (figure 4, element 68 as seen by the value of A); and compensating a timing error, when the count value is larger than the prescribed value (figure 4, element 68 and the corresponding outputs)."

However, Sugita lacks what Wright discloses, the system "which inserts a pilot symbol in a data symbol stream in a symbol unit at intervals of a predetermined number of data symbols (figure 4, element 416' functions to insert pilot symbols)" and "detecting a pilot symbol inserted in a received data symbol stream at predetermined intervals (col. 1, lines 42-col. 2, lines 1-14)."

It would have been obvious to one of ordinary skill in the art to include a pilot symbol inserter and detector for the purpose of allowing the receiver to estimate the state of the channel. The motivation for estimating the state of the channel is so that the receiver can use that information to compensate for the effects of channel fading (Wright, col. 2, lines 5-9).

Regarding claim 13, Sugita and Wright disclose the method of claim 10. However, Sugita and Wright lack "wherein the prescribed value is '1'." Although neither

Sugita nor Wright explicitly disclose the prescribed value is 1, Sugita does disclose this prescribed value to be 0. Since the overall function of this value is to simply act as a determining factor, one of ordinary skill in the art would recognize that choosing this value is simply a matter of design choice and completely dependent on how the system was designed. It would have been obvious to one of ordinary skill in the art at the time of invention to have specific value of the prescribed value for the same reasons and motivation as in claim 10.

Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugita et al. and Wright as applied to claims 8 and 10 above, and further in view of U.S. Patent 4,803,385 (Nawata).

Regarding claims 9 and 10, Sugita and Wright disclose the methods of claims 8 and 10. However, Sugita and Wright lack what Nawata discloses, "the phase difference range is $\pm\pi$ (figure 5 where it should be further noted that the phase detection has an inherent phase rang of $\pm\pi$ by the very nature of the sinusoidal signals)." It would have been obvious to one of ordinary skill in the art to know that the phase difference was $\pm\pi$ because it is well known in the art and to gain an understanding of where there will be discontinuities in the phase. The motivation for known where there will be discontinuities is to avoid these areas and possibly compensate for them.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugita et al. and Wright as applied to claim 10 above, and further in view of U.S. Patent 6,359,938 B1 (Keevill et al.).

Regarding claim 11, Sugita and Wright disclose the method of claim 10. Sugita further discloses making a decision on the timing error when it is less than a prescribed value as in claim 10. However, Sugita and Wright lack what Keevill discloses, "comprising the additional step of compensating...the timing error by converting the count value to a phase difference line and estimating a slope of the phase difference line (col. 33, lines 56-64)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the compensating the timing error by converting the count to a phase difference and estimating a slope for the intended purpose of compensating for timing errors in the signal. The motivation for compensating for timing errors is so that the signal can be properly processed within the receiver and intended communication will be correctly transmitted.

Allowable Subject Matter

Claims 4 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments, see REMARKS, page 7, paragraph 2, filed 31 January 2005, with respect to the drawing objections to figures 1, 2, and 3 have been fully considered and are persuasive. The drawing objections of figures 1, 2, and 3 have been withdrawn.

Applicant's arguments, see REMARKS, page 7, paragraph 3, filed 31 January 2005, with respect to the objections to claims 3, 6, 8, and 10 have been fully considered and are persuasive. The objections to claims 3, 6, 8, and 10 have been withdrawn.

Applicant's arguments, see REMARKS, page 7, paragraph 4, filed 31 January 2005, with respect to the 35 U.S.C. 112, first paragraph rejection of claims 11 and 12 have been fully considered and are persuasive. The 35 U.S.C. 112, first paragraph rejections of claims 11 and 12 have been withdrawn.

Applicant's arguments with respect to claims 1-3, 5, 6-11, 13, and 14 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua Kading whose telephone number is (571) 272-3070. The examiner can normally be reached on M-F: 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on (571) 272-3126. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joshua Kading
Examiner
Art Unit 2661

February 17, 2005

BOB PHUNGLH
PRIMARY EXAMINER